

REMARKS

This document is submitted in response to the Office Action dated October 24, 2006 ("Office Action").

Claims 1, 3-6, and 8-26 are pending. Claims 1, 3-6, and 8-10 are under examination. Applicants respectfully request that the Examine reconsider this application in view of the remarks below.

Rejections under 35 U.S.C. § 103

Claims 1, 3-6, and 8-10 stand rejected as being obvious over Cole, US Patent 4,320,151 ("Cole"), in view of Boinot et al., US Patent 2,529,131 ("Boinot"), Bass, US Patent 3,983,255 ("Bass"), De Sa et al., US Patent 4,337,123 ("De Sa"), and Heikkila et al., US Patent 5,730,877 ("Heikkila").

Claim 1, the only independent claim, covers a composition containing a thermolabile protein mixed with a **liquor waste**.

Cole, the primary reference, teaches a method of protecting a fungal alpha amylase against thermal denaturation by mixing the amylase with a **concentrated sugar medium**. See Abstract. More specifically, it discloses minimum sugar concentrations needed for the protective effect. See discussion below.

Among the four secondary references, Boinot, Bass, and Heikkila disclose that vinasse, a **liquor waste**, contains **sugar**, and De Sa discloses that improper disposal of vinasse can cause pollution. See Boinot, column, lines 1-4; Bass, column 6, lines 56-57; Heikkila, column 1, lines 23-25; and De Sa, column 1, lines 53-54.

The Examiner alleged that

[i]t would have been obvious to use vinasse to supply the sugar in the sugar solution that amylase is added to stabilize the amylase during heating as disclosed by Cole as suggested by Boinot et al and Bass, and if needed Heikkila et al, disclosing that vinasse contains sugar, and can be concentrated and dried, and as further suggested by De Sa et al disclosing that disposing of vinasse is a problem, and finding a use for vinasse will be of benefit. Vinasse is a liquor waste and mixing vinasse with the amylase of Cole will result in a composition as presently claimed. See the Office Action, page 3, last paragraph.

In other words, it is the Examiner's position that a skilled person in the art would have been motivated to combine Cole (which teaches using a **concentrated sugar solution** to protect an enzyme) with any of Boinot, Bass, Heikkila, and De Sa (all of which disclose vinasse, a **sugar-containing liquor waste**) to arrive at the composition of claim 1.

Applicants respectfully disagree.

Under U.S. law, “[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.” See MPEP § 2143.01.

Applicants submit that the Examiner has not established a *prima facie* case of obviousness as he failed to meet the first two basic criteria mentioned above.

Cole teaches enhancing the thermostability of a fungal amylase with a **concentrated sugar solution**, not a **liquor waste** recited in claim 1. It discloses that “[a]t least 55% sugar (by weight) was required to provide the protective effect [at 170° F, about 76° C]. When the solution was 35% sucrose, there was **insufficient** protection against thermal denaturation of the enzyme.” See column 8, lines 37-40; emphases added. As pointed out by the Examiner, Cole cites a publication, Adams, which shows “greater activity of the enzyme at pH 5.0 in solution of 20-40% sucrose compared to the activity of the enzyme in 0% sucrose [at a lower temperature of 63°C].” See column 4, lines 59-62; and the Office Action, page 3, first paragraph. Thus, the sugar concentrations required for achieving the protective effect are higher than 35% at 76°C and at least 20% at 63°C. For the sole purpose of facilitating discussion, Applicants adopt 20% as the minimum sugar concentration for the protective effect.

None of Boinot, Bass, Heikkila, and De Sa teaches that vinasse, a liquor waste, contains at least 20% sugar, the lowest sugar concentration taught in Cole for protecting a thermolabile protein. Boinot teaches that “[t]he concentration of sugars in the vinasse to be treated should be brought in actual practice to **no more than 3%** of the weight of liquid to be treated.” See

column 2, lines 33-35. Bass discloses that a dried vinasse contains 7.4% sugar. See column 6, lines 56-57. In view of this teaching in Bass, an artisan would know that the sugar concentration is **much lower than 7.4%** in a vinasse solution, from which the dried vinasse is prepared. Heikkila shows that the total sugar concentration in vinasse is 9.9%.¹ See Table 5. De Sa teaches that vinasse is a “by-product and is basically a suspension of organic and mineral substances in water” and that “vinasse contains about 90% water.” See column 1, lines 26-27; and column 2, line 9. In other words, this reference teaches that vinasse contains about 10% non-water components, e.g., sugar. Thus, according to De Sa, the sugar concentration in vinasse is **lower than 10%**.

In sum, the second references Boinot, Bass, Heikkila, and De Sa, as a whole, disclose that the sugar concentration in vinasse is **lower than 10%**. In view of this teaching, a skilled person in the art would not have been motivated to replace the concentrated sugar solution taught in Cole with vinasse, a liquor waste, to obtain the composition of claim 1, since Cole teaches that **20%** is the minimum sugar concentration needed for achieving the protective effect. Nor would he or she have been expected that replacing the concentrated sugar solution (containing **>20% sugar**) with vinasse (containing **<10% sugar**) would succeed in protecting a thermolabile protein. It is thus submitted that, taken together, the Examiner has not met the first and second basic criteria stated in MPEP § 2143.01 (quoted above).

In view of the above remarks, Applicants submit that the Examiner has clearly failed to establish a *prima facie* case of obviousness against claim 1. So do claims 3-6 and 8-10, all of which depend from claim 1. Applicants thus respectfully request that the Examiner withdraw this rejection.

¹ This number is the sum of the concentrations of tri-, di- and monosaccharides listed in Table 5 of Heikkila et al. This article mistakenly names betaine as a sugar. See column 1, line 25. Note that betaine is trimethylglycine, which is not a sugar. See www.Chemfinder.com.

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CONCLUSION

In view of the above remarks, Applicants submit that claims 1, 3-6, and 8-10 are non-obvious over Cole in view of Boinot, Bass, De Sa, and Heikkila. Allowance of these claims is respectfully solicited.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 1/24/2007



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